Grade 7 Mathematics

Item Specifications

Missouri
DEPARTMENT OF ELEMENTARY & SECONDARY
EDUCATION.

Table of Contents

Grade 7 Mathematics

Introduction

In 2014 Missouri legislators passed House Bill 1490, mandating the development of the Missouri Learning Expectations. In April of 2016, these Missouri Learning Expectations were adopted by the State Board of Education. Groups of Missouri educators from across the state collaborated to create the documents necessary to support the implementation of these expectations.

One of the documents developed is the item specification document, which includes all Missouri grade level/course expectations arranged by domains/strands. It defines what could be measured on a variety of assessments. The document serves as the foundation of the assessment development process.

Although teachers may use this document to provide clarity to the expectations, these specifications are intended for summative, benchmark, and large-scale assessment purposes.

Components of the item specifications include:

Expectation Unwrapped breaks down a list of clearly delineated content and skills the students are expected to know and be able to do upon mastery of the Expectation.

Depth of Knowledge (DOK) Ceiling indicates the highest level of cognitive complexity that would typically be assessed on a large scale assessment. The DOK ceiling is not intended to limit the complexity one might reach in classroom instruction.

Item Format indicates the types of items used in large scale assessment. For each expectation, the item format specifies the type best suited for that particular expectation.

Text Types suggests a broad list of text types for both literary and informational expectations. This list is not intended to be all inclusive: other text types may be used in the classroom setting. The expectations were written in grade level bands; for this reason, the progression of the expectations relies upon increasing levels of quantitative and qualitative text complexities.

Content Limits/Assessment Boundaries are parameters that item writers should consider when developing a large scale assessment. For example, some expectations should not be assessed on a large scale assessment but are better suited for local assessment.

Sample stems are examples that address the specific elements of each expectation and address varying DOK levels. The sample stems provided in this document are in no way intended to limit the depth and breadth of possible item stems. The expectation should be assessed in a variety of ways.

Grade 7 Mathematics

Frequently asked questions for Item Specification and Sample Stems

1. What is the purpose of the Item Specification document?
Historically, Item Specification documents are written for test item writers. In Missouri, this document was seen as a resource for not only item writers, but teachers as well. The unwrapped section should provide more detail on the meaning of the standard and the sample stems should provide example items that also help clarify the standard. In this update, the language used in the Expanded Expectations document was included to merge the two documents for easier access. In some standards a "Notes" section was added to provide additional information.

2. Why do some unwrapped sections have the same few sentences at the beginning?
For standards that have multiple parts and are listed as sub expectations, e.g., NF.C.5.b, the first part highlights the intent of that standard series. Often, these standards should be taught together as they develop a bigger idea or concept.

3. Why is the Fluency definition only on some standards?
Certainly, students having experience using different strategies and picking the strategy they feel best for given situations is important to improving student knowledge in mathematics. The Missouri Educators working on the document felt it important to highlight areas where student access to multiple strategies would provide the greatest support. Listing fluency in all standards would likely lessen the impact needed.

4. What does the "e.g." mean when listed in the unwrapped section?
The "e.g." is a way to highlight a list of examples, ideas, or concepts. It is **not** an exhaustive list, nor is it intended to represent the best examples. It is merely a partial list to provide some examples.

5. What does "with or without context" mean?
This phrase was used to highlight that the math problems might have some situational context or could possibly be a strictly number or symbol situation. The Educators working on this update wanted the focus to be on using math to solve problem situations rather than a focus on "real world" problems.

6. Are the Sample Stems examples of summative test items?
The Sample Stems could be a classroom item or possibly an assessment item. In some cases, the problem used would have to be adjusted to use on a Statewide assessment. The goal was to give students and teachers a problem that aligns to the standard. The Stems provided in the document are an example. The educators assisting with the update in some cases created more than one example and those are listed at the bottom of the document. All examples are good, some fit better on the page within the Item Specification which have determined those shown in both places.

7. Why are there no answers listed with the Sample Stems?
The focus of the Sample Stems should be on the work students can demonstrate to indicate their level of understanding for the given standard. While the answer is one component, when given, it frequently becomes the focus which does not provide important information in the learning process.

8. What does "No Limits" mean in the Limits and Boundaries section?
Where there are no limits or boundaries to be listed, "No Limits" was used to indicate this situation and help those using the document understand that it wasn't an oversight. IMPORTANT NOTE: if the standard itself or the cluster heading lists a specific limit, e.g., specific denominators, size or type of number, that was not duplicated in the Limits section.

9. Why do some words show a short definition?
While this does not serve as a replacement for a glossary, there were terms within the unwrapping that the committee felt should have meaning included. This occurs in the standard where it specifically addresses the concept in the standard, e.g., cardinality, trapezoid.

10. Why are Kindergarten and Grade 1 Sample Stems a bit different?
Students in Kindergarten and Grade 1 are beginning readers, so teachers should expect to read problems to the students rather than only providing problems to be solved.

Grade 7 Mathematics

Mathematics	7.RP.A.1

RP A 1	**Ratios and Proportional Relationships** **Analyze proportional relationships and use them to solve problems** Compute unit rates, including those that involve complex fractions, with like or different units.	

Expectation Unwrapped – the intent of this section is to describe the elements of the expectation, but are NOT additional standards or expectations.	Sample Stems
The expectation of the student is to compute unit rates, including those that involve complex fractions, with like or different units. The student will understand that a unit rate is a comparison of two quantities ($\frac{a}{b}$, where *b=1*). The student will compute a unit rate where the numerator and/or denominator may be given as fractions. The student will compute unit rates that involve negative (loss) values. The student will describe rates in terms of the units involved.	Linda runs one third of a mile in 4 minutes. If she continues at the same speed, how can this situation be used to describe a unit rate? Use this information to determine how long it will take her to run 1 mile. Explain your solution, be sure to include a description of the rate in terms of the units used in the problem. Additional Stems for 7th Grade Found at End of Document.
State Assessment Content Limits/Boundaries - Classroom Work Should Extend Beyond These Limits No Limits.	**Calculator Designation** **YES** – a calculator will be available for items
DOK Ceiling: 3	
Item Format: Selected Response, Constructed Response, Technology Enhanced	

Grade 7 Mathematics

Mathematics	7.RP.A.2.a
RP **Ratios and Proportional Relationships**	**PRIORITY STANDARD**
A **Analyze proportional relationships and use them to solve problems**	
2 Recognize and represent proportional relationships between quantities.	
a Determine when two quantities are in a proportional relationship.	

Expectation Unwrapped – the intent of this section is to describe the elements of the expectation, but are NOT additional standards or expectations.	Sample Stems
The expectations in 7.RP.A.2 (a through d) show how 7th grade students will recognize and represent proportional relationships between quantities in equations, tables, graphs, diagrams, to solve problems with or without context. The student will determine when two quantities are in a proportional relationship.	Kristie signed up for a gym membership at Fitness Plus. Her plan cost $95 in start-up fees the first month and then $20 per month thereafter. Her friend Teri also signed up at Fitness Plus during a 3-day promotional offer that waived the initial start-up fees. Her plan costs $35 per month. Decide if either or both gym memberships are described by a proportional relationship. Support your answer using tables, graphs, and/or equations. Additional Stems for 7th Grade Found at End of Document.

State Assessment Content Limits/Boundaries - Classroom Work Should Extend Beyond These Limits	Calculator Designation
No Limits.	**YES** – a calculator will be available for items

DOK Ceiling: 3

Item Format: Selected Response, Constructed Response, Technology Enhanced
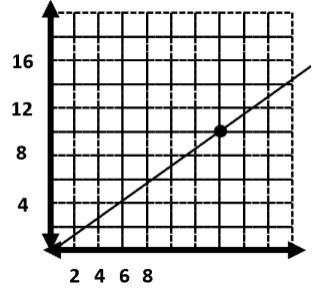
Grade 7 Mathematics

Mathematics	7.RP.A.2.b

RP	**Ratios and Proportional Relationships**
A	**Analyze proportional relationships and use them to solve problems**
2	Recognize and represent proportional relationships between quantities.
b	Identify and/or compute the constant of proportionality (unit rate).

Expectation Unwrapped – the intent of this section is to describe the elements of the expectation, but are NOT additional standards or expectations.	**Sample Stems**
The expectations in 7.RP.A.2 (a through d) show how 7th grade students will recognize and represent proportional relationships between quantities in equations, tables, graphs, diagrams, to solve problems with or without context. The student will identify the constant of proportionality (unit rate). The quantities y and x are proportional if $\frac{y}{x}$ is constant. The student will compute the constant of proportionality (unit rate).	Mark and Michelle are comparing inches and feet. Mark says that the constant of proportionality is 12. Michelle says it is $\frac{1}{12}$. Do you agree with either of them? Explain your reasoning. Additional Stems for 7th Grade Found at End of Document.

State Assessment Content Limits/Boundaries - Classroom Work Should Extend Beyond These Limits	**Calculator Designation**
No Limits.	**YES** – a calculator will be available for items
DOK Ceiling: 3	
Item Format: Selected Response, Constructed Response, Technology Enhanced	

Grade 7 Mathematics

Mathematics	7.RP.A.2.c
RP — **Ratios and Proportional Relationships**	**PRIORITY STANDARD**
A — **Analyze proportional relationships and use them to solve problems**	
2 — Recognize and represent proportional relationships between quantities.	
c — Explain what a point (x, y) on the graph of a proportional relationship means in terms of the situation.	

Expectation Unwrapped – the intent of this section is to describe the elements of the expectation, but are NOT additional standards or expectations.	Sample Stems
The expectations in 7.RP.A.2 (a through d) show how 7th grade students will recognize and represent proportional relationships between quantities in equations, tables, graphs, diagrams, to solve problems with or without context. The student will explain what a point (x, y) on the graph of a proportional relationship means in terms of the situation, with special attention to the points $(0, 0)$ and $(1, r)$. The student will understand that r is the constant of proportionality (unit rate) in the ordered pair $(1, r)$. The student will use units as a way of explaining a proportional relationship.	Create a context that could be represented by the graph below. Give your graph a title and label the axes. What does the point on the graph represent in the context you've created? Additional Stems for 7th Grade Found at End of Document.

State Assessment Content Limits/Boundaries - Classroom Work Should Extend Beyond These Limits	Calculator Designation
No Limits.	**YES** – a calculator will be available for items

DOK Ceiling: 3

Item Format: Selected Response, Constructed Response, Technology Enhanced

Grade 7 Mathematics

Mathematics	7.RP.A.2.d

RP	**Ratios and Proportional Relationships**
A	**Analyze proportional relationships and use them to solve problems**
2	Recognize and represent proportional relationships between quantities.
d	Recognize that the graph of any proportional relationship will pass through the origin.

Expectation Unwrapped – the intent of this section is to describe the elements of the expectation, but are NOT additional standards or expectations.	**Sample Stems**
The expectations in 7.RP.A.2 (a through d) show how 7th grade students will recognize and represent proportional relationships between quantities in equations, tables, graphs, diagrams, to solve problems with or without context. The student will recognize that the graph of any proportional relationship will pass through the origin. The student will explain why a proportional relationship must pass through the origin. The student will distinguish between graphs of proportional and nonproportional relationships.	Describe the characteristics of a graph of any proportional relationship. Additional Stems for 7th Grade Found at End of Document.
State Assessment Content Limits/Boundaries - Classroom Work Should Extend Beyond These Limits No Limits.	**Calculator Designation** **YES** – a calculator will be available for items
DOK Ceiling: 3	
Item Format: Selected Response, Constructed Response, Technology Enhanced	

Grade 7 Mathematics

Mathematics	7.RP.A.3

RP A 3	**Ratios and Proportional Relationships**	**PRIORITY STANDARD**
	Analyze proportional relationships and use them to solve problems	
	Solve problems involving ratios, rates, percentages and proportional relationships.	

Expectation Unwrapped – the intent of this section is to describe the elements of the expectation, but are NOT additional standards or expectations.	**Sample Stems**
The student will solve problems with or without context involving ratios, rates, proportional relationships, and percentages such as sales tax, discounts (markdowns), markups, tips, and percent of change.	Fred has $1,000 in his savings account. A year earlier he started with $750. What was the percent increase in his savings account?
	Additional Stems for 7th Grade Found at End of Document.

State Assessment Content Limits/Boundaries - Classroom Work Should Extend Beyond These Limits	**Calculator Designation**
No Limits.	**YES** – a calculator will be available for items

DOK Ceiling: 3

Item Format: Selected Response, Constructed Response, Technology Enhanced

Grade 7 Mathematics

Mathematics	7.NS.A.1.a

NS	**Number Sense and Operations**	
A	**Apply and extend previous understandings of operations to add, subtract, multiply and divide rational numbers.**	
1	Apply and extend previous understandings of numbers to add and subtract rational numbers.	
a	Add and subtract rational numbers.	

Expectation Unwrapped – the intent of this section is to describe the elements of the expectation, but are NOT additional standards or expectations.	**Sample Stems**
The expectations in 7.NS.A.1 (a through f) show how 7th grade students will apply and extend previous understandings of numbers to add and subtract rational numbers to solve problems with or without context. The student will add and subtract rational numbers (fractions, decimals, and integers).	John found the difference between two negative numbers and the solution was positive. Jane said that cannot happen. Which student is correct and explain why? Additional Stems for 7th Grade Found at End of Document.

State Assessment Content Limits/Boundaries - Classroom Work Should Extend Beyond These Limits	**Calculator Designation**
No Limits.	**YES** – a calculator will be available for items
DOK Ceiling: 2	
Item Format: Selected Response, Constructed Response, Technology Enhanced	

Grade 7 Mathematics

Mathematics	7.NS.A.1.b

NS	Number Sense and Operations
A	**Apply and extend previous understandings of operations to add, subtract, multiply and divide rational numbers.**
1	Apply and extend previous understandings of numbers to add and subtract rational numbers.
b	Represent addition and subtraction on a horizontal or vertical number line.

Expectation Unwrapped – the intent of this section is to describe the elements of the expectation, but are NOT additional standards or expectations.	Sample Stems
The expectations in 7.NS.A.1 (a through f) show how 7th grade students will apply and extend previous understandings of numbers to add and subtract rational numbers to solve problems with or without context. The student will represent addition and subtraction on a horizontal or vertical number line.	Create an addition and a subtraction problem using rational numbers. Represent each problem's solution using a number line (either vertical or horizontal). Additional Stems for 7th Grade Found at End of Document.

State Assessment Content Limits/Boundaries - Classroom Work Should Extend Beyond These Limits	Calculator Designation
No Limits.	**YES** – a calculator will be available for items

DOK Ceiling: 3

Item Format: Selected Response, Constructed Response, Technology Enhanced

Grade 7 Mathematics

Mathematics	7.NS.A.1.c
NS Number Sense and Operations	**PRIORITY STANDARD**
A Apply and extend previous understandings of operations to add, subtract, multiply and divide rational numbers.	
1 Apply and extend previous understandings of numbers to add and subtract rational numbers.	
c Describe situations and show that a number and its opposite have a sum of 0 (additive inverses).	

Expectation Unwrapped – the intent of this section is to describe the elements of the expectation, but are NOT additional standards or expectations.	Sample Stems
The expectations in 7.NS.A.1 (a through f) show how 7th grade students will apply and extend previous understandings of numbers to add and subtract rational numbers to solve problems with or without context. The student will describe situations and show that a number and its opposite have a sum of 0 (are additive inverses). The student will give examples of additive inverses.	Given $a + b = 0$. John says b must be negative. Jane does not agree. Who is correct and why? Additional Stems for 7th Grade Found at End of Document.
State Assessment Content Limits/Boundaries - Classroom Work Should Extend Beyond These Limits No Limits.	**Calculator Designation** **YES** – a calculator will be available for items
DOK Ceiling: 3	
Item Format: Selected Response, Constructed Response, Technology Enhanced	

Grade 7 Mathematics

Mathematics	7.NS.A.1.d

NS	**Number Sense and Operations**
A	**Apply and extend previous understandings of operations to add, subtract, multiply and divide rational numbers.**
1	Apply and extend previous understandings of numbers to add and subtract rational numbers.
d	Understand subtraction of rational numbers as adding the additive inverse.

Expectation Unwrapped – the intent of this section is to describe the elements of the expectation, but are NOT additional standards or expectations.	Sample Stems
The expectations in 7.NS.A.1 (a through f) show how 7th grade students will apply and extend previous understandings of numbers to add and subtract rational numbers to solve problems with or without context. The student will understand the relationship between subtracting rational numbers and adding the additive inverse, $p - q = p + (-q)$.	Explain why the subtraction of a rational number is the same as adding that rational number's additive inverse. Use examples in your explanation. Additional Stems for 7th Grade Found at End of Document.

State Assessment Content Limits/Boundaries - Classroom Work Should Extend Beyond These Limits	Calculator Designation
No Limits.	**YES** – a calculator will be available for items

DOK Ceiling: 3

Item Format: Selected Response, Constructed Response, Technology Enhanced

Grade 7 Mathematics

Mathematics	7.NS.A.1.e

NS	**Number Sense and Operations**
A	**Apply and extend previous understandings of operations to add, subtract, multiply and divide rational numbers.**
1	Apply and extend previous understandings of numbers to add and subtract rational numbers.
e	Determine the distance between two rational numbers on the number line is the absolute value of their difference.

Expectation Unwrapped – the intent of this section is to describe the elements of the expectation, but are NOT additional standards or expectations.	**Sample Stems**
The expectations in 7.NS.A.1 (a through f) show how 7th grade students will apply and extend previous understandings of numbers to add and subtract rational numbers to solve problems with or without context. The student will show that the distance between two rational numbers on the number line is the absolute value of their difference. The student will understand that the distance between the points a and b on a number line can be found by $\lvert a - b \rvert$ or $\lvert b - a \rvert$.	Create a subtraction problem and show how its solution can be represented on a number line. After showing the solution, explain how the number line (the distance) is one way to represent the absolute value of the difference between the numbers in the subtraction problem. Additional Stems for 7th Grade Found at End of Document.

State Assessment Content Limits/Boundaries - Classroom Work Should Extend Beyond These Limits	**Calculator Designation**
No Limits.	**YES** – a calculator will be available for items

DOK Ceiling: 3

Item Format: Selected Response, Constructed Response, Technology Enhanced

Grade 7 Mathematics

Mathematics	7.NS.A.1.f
NS **Number Sense and Operations**	**PRIORITY STANDARD**
A **Apply and extend previous understandings of operations to add, subtract, multiply and divide rational numbers.**	
1 Apply and extend previous understandings of numbers to add and subtract rational numbers.	
f Interpret sums and differences of rational numbers.	

Expectation Unwrapped – the intent of this section is to describe the elements of the expectation, but are NOT additional standards or expectations.	Sample Stems
The expectations in 7.NS.A.1 (a through f) show how 7th grade students will apply and extend previous understandings of numbers to add and subtract rational numbers to solve problems with or without context. The student will interpret sums and differences of rational numbers.	Give an example of where $a + b < a - b$. Additional Stems for 7th Grade Found at End of Document.
State Assessment Content Limits/Boundaries - Classroom Work Should Extend Beyond These Limits No Limits.	**Calculator Designation** **YES** – a calculator will be available for items
DOK Ceiling: 3	
Item Format: Selected Response, Constructed Response, Technology Enhanced	

Grade 7 Mathematics

Mathematics	7.NS.A.2.a

NS	**Number Sense and Operations**
A	**Apply and extend previous understandings of operations to add, subtract, multiply and divide rational numbers.**
2	Apply and extend previous understandings of numbers to multiply and divide rational numbers.
a	Multiply and divide rational numbers.

Expectation Unwrapped – the intent of this section is to describe the elements of the expectation, but are NOT additional standards or expectations.	Sample Stems
The expectations in 7.NS.A.2 (a through f) show how 7th grade students will apply and extend previous understandings of numbers to multiply and divide rational numbers. The student will multiply and divide rational numbers to include fractions, decimals, and integers. The student will demonstrate fluency with multiplication and division of rational numbers. **Mathematical Fluency** is more than a quick answer on some timed test. Students demonstrate Fluency when they do mathematics using an ***appropriate strategy*** in a reasonable amount of time, ***knowing multiple processes*** and can apply or adapt strategies to find a correct solution. The student will use and explain multiple strategies to solve problems with or without context involving multiplication and division of rational numbers.	A group of students are working on dividing rational numbers. One student solved the following problem and found the answer was 2. Do you agree with this solution? Explain why or why not, if you disagree what are some possible errors the student made? $$2\frac{2}{3} \div \frac{2}{3}$$ Additional Stems for 7th Grade Found at End of Document.
State Assessment Content Limits/Boundaries - Classroom Work Should Extend Beyond These Limits No Limits.	**Calculator Designation** **YES** – a calculator will be available for items
DOK Ceiling: 3	
Item Format: Selected Response, Constructed Response, Technology Enhanced	

Grade 7 Mathematics

Mathematics	7.NS.A.2.b
NS **Number Sense and Operations**	PRIORITY STANDARD
A **Apply and extend previous understandings of operations to add, subtract, multiply and divide rational numbers.**	
2 Apply and extend previous understandings of numbers to multiply and divide rational numbers.	
b Determine that a number and its reciprocal have a product of 1 (multiplicative inverse).	

Expectation Unwrapped – the intent of this section is to describe the elements of the expectation, but are NOT additional standards or expectations.	Sample Stems
The expectations in 7.NS.A.2 (a through f) show how 7th grade students will apply and extend previous understandings of numbers to multiply and divide rational numbers. The student will determine that a number and its reciprocal (multiplicative inverse) have a product of 1. The student will find the reciprocal (multiplicative inverse) of any non-zero rational number. The student will understand that if the product of two numbers is one then the numbers are multiplicative inverses.	Can a fraction and a decimal be multiplicative inverses? If so, give an example. Explain why two numbers are multiplicative inverses. Additional Stems for 7th Grade Found at End of Document.
State Assessment Content Limits/Boundaries - Classroom Work Should Extend Beyond These Limits No Limits.	**Calculator Designation** **YES** – a calculator will be available for items
DOK Ceiling: 3	
Item Format: Selected Response, Constructed Response, Technology Enhanced	

Grade 7 Mathematics

Mathematics	7.NS.A.2.c

NS	**Number Sense and Operations**
A	**Apply and extend previous understandings of operations to add, subtract, multiply and divide rational numbers.**
2	Apply and extend previous understandings of numbers to multiply and divide rational numbers.
c	Understand that every quotient of integers (with non-zero divisor) is a rational number.

Expectation Unwrapped – the intent of this section is to describe the elements of the expectation, but are NOT additional standards or expectations.	**Sample Stems**
The expectations in 7.NS.A.2 (a through f) show how 7th grade students will apply and extend previous understandings of numbers to multiply and divide rational numbers. The student will understand that dividing an integer by another integer, other than zero, results in a rational number. If p and q are non-zero integers, then $-\frac{p}{q} = \frac{-p}{q} = \frac{p}{-q}$. The student will understand any number that can be expressed as the ratio of two integers is a rational number. The student will know and recognize that any value divided by zero is undefined. Note: -p can be identified as "the opposite of p" or as "negative p". The more important idea is that -p may not represent a negative number, e.g., if p = -3, then -p equals 3.	Two students are discussing whether $\frac{1}{3}$ is rational or irrational. Describe a few ways to show that it is rational and a few ways to show that it is irrational. What is the correct answer? Additional Stems for 7th Grade Found at End of Document.
State Assessment Content Limits/Boundaries - Classroom Work Should Extend Beyond These Limits No Limits.	**Calculator Designation** **YES** – a calculator will be available for items
DOK Ceiling: 3	
Item Format: Selected Response, Constructed Response, Technology Enhanced	

Grade 7 Mathematics

Mathematics	7.NS.A.2.d
NS	**Number Sense and Operations**
A	**Apply and extend previous understandings of operations to add, subtract, multiply and divide rational numbers.**
2	Apply and extend previous understandings of numbers to multiply and divide rational numbers.
d	Convert a rational number to a decimal.

Expectation Unwrapped – the intent of this section is to describe the elements of the expectation, but are NOT additional standards or expectations.	Sample Stems
The expectations in 7.NS.A.2 (a through f) show how 7th grade students will apply and extend previous understandings of numbers to multiply and divide rational numbers. The student will convert a rational number to a decimal. The student will understand that all rational numbers can be represented in equivalent forms as a decimal, percent, or as a fraction.	Convert each of the numbers or percent below. Describe how each represents a rational number. $\frac{2}{9}$ $\frac{43}{99}$ $\frac{5}{6}$ 25% $\frac{5}{4}$ $\frac{45}{7}$ Additional Stems for 7th Grade Found at End of Document.

State Assessment Content Limits/Boundaries - Classroom Work Should Extend Beyond These Limits	Calculator Designation
Assessments will use the vinculum notation ($0.\overline{43}$) to denote repeated digits and not the ellipsis (…) or another notation.	**YES** – a calculator will be available for items

DOK Ceiling: 3

Item Format: Selected Response, Constructed Response, Technology Enhanced

Grade 7 Mathematics

Mathematics	7.NS.A.2.e

NS	**Number Sense and Operations**
A	**Apply and extend previous understandings of operations to add, subtract, multiply and divide rational numbers.**
2	Apply and extend previous understandings of numbers to multiply and divide rational numbers.
e	Understand that all rational numbers can be written as fractions or decimal numbers that terminate or repeat.

Expectation Unwrapped – the intent of this section is to describe the elements of the expectation, but are NOT additional standards or expectations.	**Sample Stems**
The expectations in 7.NS.A.2 (a through f) show how 7th grade students will apply and extend previous understandings of numbers to multiply and divide rational numbers. The student will understand that some rational numbers can be written as integers and all rational numbers can be written as fractions or decimal numbers that terminate or repeat. The student will represent terminating and repeating decimals. The student will understand, including explaining the equivalency, that all rational numbers can be represented in equivalent forms as a decimal, percent, or as a fraction.	Explain whether $\frac{\frac{1}{2}}{\frac{1}{3}}$ is a rational number or an irrational number? Explain your answer. Additional Stems for 7th Grade Found at End of Document.

State Assessment Content Limits/Boundaries - Classroom Work Should Extend Beyond These Limits	**Calculator Designation**
Assessments will use the vinculum notation ($0.\overline{43}$) to denote repeated digits and not the ellipsis (…) or another notation.	**YES** – a calculator will be available for items

DOK Ceiling: 3

Item Format: Selected Response, Constructed Response, Technology Enhanced

Grade 7 Mathematics

Mathematics	7.NS.A.2.f
NS Number Sense and Operations	PRIORITY STANDARD

NS	**Number Sense and Operations**	**PRIORITY STANDARD**
A	**Apply and extend previous understandings of operations to add, subtract, multiply and divide rational numbers.**	
2	Apply and extend previous understandings of numbers to multiply and divide rational numbers.	
f	Interpret products and quotients of rational numbers by describing real-world contexts.	

Expectation Unwrapped – the intent of this section is to describe the elements of the expectation, but are NOT additional standards or expectations.	**Sample Stems**
The expectations in 7.NS.A.2 (a through f) show how 7th grade students will apply and extend previous understandings of numbers to multiply and divide rational numbers. The student will interpret (describe the solution and remainders to the context of the problem) products and quotients of rational numbers for problems.	John has $2\frac{1}{3}$ pints of orange juice concentrate. It takes $\frac{2}{3}$ pints to make a pitcher of orange juice. What type of question would be answered if this information was used to find a product? What type of question would be answered if this information was used to find a quotient? Be sure to include both solutions in your explanation. Additional Stems for 7th Grade Found at End of Document.

State Assessment Content Limits/Boundaries - Classroom Work Should Extend Beyond These Limits	**Calculator Designation**
No Limits.	**YES** – a calculator will be available for items
DOK Ceiling: 3	
Item Format: Selected Response, Constructed Response, Technology Enhanced	

Grade 7 Mathematics

Mathematics	7.NS.A.3
NS **A** **3**	**Number Sense and Operations** — **PRIORITY STANDARD**

NS A 3	**Number Sense and Operations**
	Apply and extend previous understandings of operations to add, subtract, multiply and divide rational numbers.
	Solve problems involving the four arithmetic operations with rational numbers.

Expectation Unwrapped – the intent of this section is to describe the elements of the expectation, but are NOT additional standards or expectations.	Sample Stems
The student will solve problems with or without context involving the four arithmetic operations with rational numbers. **Mathematical Fluency** is more than a quick answer on some timed test. Students demonstrate Fluency when they do mathematics using an *appropriate strategy* in a reasonable amount of time, *knowing multiple processes* and can apply or adapt strategies to find a correct solution. The student will use and explain multiple strategies to solve problems with or without context involving the four arithmetic operations with rational numbers.	Randomly draw numbers and fill in the squares below immediately after drawing. Which operation, + - x or ÷, would create the greatest solution when placed in the circle? Additional Stems for 7th Grade Found at End of Document.

State Assessment Content Limits/Boundaries - Classroom Work Should Extend Beyond These Limits	Calculator Designation
No Limits.	**YES** – a calculator will be available for items

DOK Ceiling: 3

Item Format: Selected Response, Constructed Response, Technology Enhanced

Grade 7 Mathematics

Mathematics	7.EEI.A.1
EEI **Expressions, Equations and Inequalities**	**PRIORITY STANDARD**
A **Use properties of operations to generate equivalent expressions.**	
1 Apply properties of operations to simplify and to factor linear algebraic expressions with rational coefficients.	

Expectation Unwrapped – the intent of this section is to describe the elements of the expectation, but are NOT additional standards or expectations.	**Sample Stems**
The student will apply properties of operations, e.g., associative, commutative, distributive, identity, to simplify and to factor linear algebraic expressions with rational coefficients.	Simplify the following expression: $$6 - 3(4x - 2y)$$ Simplify the following expression: $$(2x + 3 + 4x) \div 6$$
	Additional Stems for 7th Grade Found at End of Document.

State Assessment Content Limits/Boundaries - Classroom Work Should Extend Beyond These Limits	**Calculator Designation**
No Limits.	**YES** – a calculator will be available for items
DOK Ceiling: 3	
Item Format: Selected Response, Constructed Response, Technology Enhanced	

Grade 7 Mathematics

Mathematics	7.EEI.A.2

	Expressions, Equations and Inequalities	PRIORITY STANDARD
EEI A 2	**Use properties of operations to generate equivalent expressions.** Understand how to use equivalent expressions to clarify quantities in a problem.	

Expectation Unwrapped – the intent of this section is to describe the elements of the expectation, but are NOT additional standards or expectations.	**Sample Stems**
The student will understand how to use equivalent expressions (including numeric and algebraic) to clarify quantities in problems with or without context, e.g., adding a 5% tax to the total is the same as multiplying the total by 1.05; $a + 0.05a = 1.05a$. **Mathematical Fluency** is more than a quick answer on some timed test. Students demonstrate Fluency when they do mathematics using an *appropriate strategy* in a reasonable amount of time, *knowing multiple processes* and can apply or adapt strategies to find a correct solution. The student will use and explain multiple strategies to solve problems with or without context to determine how to use equivalent expressions to clarify quantities in a problem.	Jenny believes that adding a 20% tip can be calculated in more than one way. She uses the example of a 20% tip on a $80 food bill could calculated either by 80(1.2) or by adding 80 and 80(0.2). Do you agree with Jenny? Explain why you agree, what Jenny did in error. Additional Stems for 7th Grade Found at End of Document.

State Assessment Content Limits/Boundaries - Classroom Work Should Extend Beyond These Limits	**Calculator Designation**
Limit to linear expressions with a degree of 1.	**YES** – a calculator will be available for items
DOK Ceiling: 3	
Item Format: Selected Response, Constructed Response, Technology Enhanced	

Grade 7 Mathematics

Mathematics	7.EEI.B.3.a

EEI	Expressions, Equations and Inequalities
B	**Solve problems using numerical and algebraic expressions and equations.**
3	Solve multi-step problems posed with rational numbers.
a	Convert between equivalent forms of the same number.

Expectation Unwrapped – the intent of this section is to describe the elements of the expectation, but are NOT additional standards or expectations.	Sample Stems
The expectations in 7.EEI.B.3 (a and b) show how 7th grade students will solve multi-step problems with or without context, posed with positive and negative rational numbers in any form, e.g., integers, fractions, and decimals, by applying properties of operations as strategies to calculate with numbers. The student will convert between equivalent forms of the same number and be able to describe the benefit of the conversion.	Use the number $\frac{1}{3}$ to show situations or problems when you would use equivalent forms of the number rather this rational form. Additional Stems for 7th Grade Found at End of Document.

State Assessment Content Limits/Boundaries - Classroom Work Should Extend Beyond These Limits	Calculator Designation
No Limits.	**YES** – a calculator will be available for items

DOK Ceiling: 3

Item Format: Selected Response, Constructed Response, Technology Enhanced

Grade 7 Mathematics

Mathematics	7.EEI.B.3.b
EEI — **Expressions, Equations and Inequalities**	**PRIORITY STANDARD**
B — **Solve problems using numerical and algebraic expressions and equations.**	
3 — Solve multi-step problems posed with rational numbers.	
b — Assess the reasonableness of answers using mental computation and estimation strategies.	

Expectation Unwrapped – the intent of this section is to describe the elements of the expectation, but are NOT additional standards or expectations.	**Sample Stems**
The expectations in 7.EEI.B.3 (a and b) show how 7th grade students will solve multi-step problems with or without context, posed with positive and negative rational numbers in any form, e.g., integers, fractions, and decimals, by applying properties of operations as strategies to calculate with numbers.	Wren was asked to calculate 25.1 x 2.2 mentally. Wren's answer was 502.2. Without calculating, explain how Wren can know if this is (or is not) a reasonable answer.
The student will determine the reasonableness of answers using mental computation and estimation strategies.	
Mathematical Fluency is more than a quick answer on some timed test. Students demonstrate Fluency when they do mathematics using an *appropriate strategy* in a reasonable amount of time, *knowing multiple processes* and can apply or adapt strategies to find a correct solution.	
The student will use and explain multiple strategies to solve problems with or without context to determine the reasonableness of answers using mental computation and estimation strategies.	
	Additional Stems for 7th Grade Found at End of Document.

State Assessment Content Limits/Boundaries - Classroom Work Should Extend Beyond These Limits	**Calculator Designation**
No Limits.	**YES** – a calculator will be available for items

DOK Ceiling: 3

Item Format: Selected Response, Constructed Response, Technology Enhanced

Grade 7 Mathematics

Mathematics	7.EEI.B.4.a

EEI	**Expressions, Equations and Inequalities**	
B	**Solve problems using numerical and algebraic expressions and equations.**	
4	Write and/or solve linear equations and inequalities in one variable.	
a	Write and/or solve equations of the form x+p = q and px = q in which p and q are rational numbers.	

Expectation Unwrapped – the intent of this section is to describe the elements of the expectation, but are NOT additional standards or expectations.	**Sample Stems**
The expectations in 7.EEI.B.4 (a through c) show how 7th grade students will write and/or solve problems, with or without context, by using and solving linear equations in one variable. The student will write and solve one-step linear equations of the form $x + p = q$ and $px = q$ in which p and q are rational numbers. Note: Linear equations can be in multiple forms, e.g., $q = px$	For each of the equations below, identify a few things you believe must be true about x before solving for x. Then, solve each equation for x. $$x - 5 = 7$$ $$3 = -2x$$ $$3 = -2 + x$$ $$\frac{x}{-3} = \frac{1}{2}$$ $$\frac{5}{3}x = -10$$ Additional Stems for 7th Grade Found at End of Document.

State Assessment Content Limits/Boundaries - Classroom Work Should Extend Beyond These Limits	**Calculator Designation**
No Limits.	**YES** – a calculator will be available for items
DOK Ceiling: 3	
Item Format: Selected Response, Constructed Response, Technology Enhanced	

Grade 7 Mathematics

Mathematics	7.EEI.B.4.b
EEI **Expressions, Equations and Inequalities**	**PRIORITY STANDARD**
B **Solve problems using numerical and algebraic expressions and equations.**	
4 Write and/or solve linear equations and inequalities in one variable.	
b Write and/or solve two-step equations of the form px + q = r and p(x + q) = r, where p, q and r are rational numbers, and interpret the meaning of the solution in the context of the problem.	

Expectation Unwrapped – the intent of this section is to describe the elements of the expectation, but are NOT additional standards or expectations.	**Sample Stems**
The expectations in 7.EEI.B.4 (a through c) show how 7th grade students will write and/or solve problems, with or without context, by using and solving linear equations in one variable. The student will write and/or solve two-step linear equations of the form $px + q = r$ and $p(x + q) = r$, where p, q and r are rational numbers and interpret the meaning of the solution in the context of the problem. **Mathematical Fluency** is more than a quick answer on some timed test. Students demonstrate Fluency when they do mathematics using an _**appropriate strategy**_ in a reasonable amount of time, _**knowing multiple processes**_ and can apply or adapt strategies to find a correct solution. The student will use and explain multiple strategies to solve problems with or without context to determine the solution of two-step equations.	Solve the following equation for x. $$5 = \frac{2}{3}(x - 7)$$ Additional Stems for 7th Grade Found at End of Document.

State Assessment Content Limits/Boundaries - Classroom Work Should Extend Beyond These Limits	**Calculator Designation**
No Limits.	**YES** – a calculator will be available for items
DOK Ceiling: 3	
Item Format: Selected Response, Constructed Response, Technology Enhanced	

Grade 7 Mathematics

Mathematics	7.EEI.B.4.c
EEI **Expressions, Equations and Inequalities**	**PRIORITY STANDARD**
B **Solve problems using numerical and algebraic expressions and equations.**	
4 Write and/or solve linear equations and inequalities in one variable.	
c Write, solve and/or graph inequalities of the form px + q > r or px + q < r, where p, q and r are rational numbers.	

Expectation Unwrapped – the intent of this section is to describe the elements of the expectation, but are NOT additional standards or expectations.	Sample Stems
The expectations in 7.EEI.B.4 (a through c) show how 7th grade students will write and/or solve problems, with or without context, by using and solving linear equations in one variable. The student will write, solve, and/or graph two-step linear inequalities of the form $px + q > r$ or $px + q < r$ where p, q and r are rational numbers and interpret the meaning of the solution in the context of the problem. Note: The unknown can be on either side of the inequality sign. While the standard specifically lists only $<$ and $>$, classroom experiences should include these as well as situations using $\leq$ and $\geq$ as well. **Mathematical Fluency** is more than a quick answer on some timed test. Students demonstrate Fluency when they do mathematics using an *appropriate strategy* in a reasonable amount of time, *knowing multiple processes* and can apply or adapt strategies to find a correct solution. The student will use and explain multiple strategies to solve problems with or without context to determine the solution of two-step inequalities.	An airline allows passengers to bring a suitcase that weighs less than or equal to 50 pounds onto the airplane for free. If a suitcase weighs more than 50 pounds, then the passenger will be charged a fee of $25. Kati is going on a trip and is packing her suitcase. Her suitcase weighs 4.8 pounds when it is empty. Write an inequality to represent the number of pounds that Kati can pack in her suitcase and not pay the fee. Additional Stems for 7th Grade Found at End of Document.
State Assessment Content Limits/Boundaries - Classroom Work Should Extend Beyond These Limits No Limits.	**Calculator Designation** **YES** – a calculator will be available for items
DOK Ceiling: 3	
Item Format: Selected Response, Constructed Response, Technology Enhanced	

Grade 7 Mathematics

Mathematics	7.GM.A.1

GM A 1	Geometry and Measurement	PRIORITY STANDARD
	Draw and describe geometrical figures and describe the relationships between them.	
	Solve problems involving scale drawings of real objects and geometric figures, including computing actual lengths and areas from a scale drawing and reproducing the drawing at a different scale.	

Expectation Unwrapped – the intent of this section is to describe the elements of the expectation, but are NOT additional standards or expectations.	**Sample Stems**
The student will solve problems involving scale drawings of real objects and geometric figures, including computing actual lengths and areas from a scale drawing, and reproducing the drawing at a different scale.	A scale drawing of a kitchen floor is $5\frac{3}{4}$ inches by $4\frac{1}{4}$ inches. If the scale is 1 in:24 in, what are the dimensions of the floor in feet?
	Additional Stems for 7th Grade Found at End of Document.

State Assessment Content Limits/Boundaries - Classroom Work Should Extend Beyond These Limits	**Calculator Designation**
No Limits.	**YES** – a calculator will be available for items

DOK Ceiling: 3

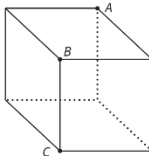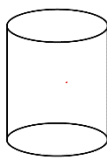**Item Format:** Selected Response, Constructed Response, Technology Enhanced

Grade 7 Mathematics

Mathematics	7.GM.A.2.a

GM	**Geometry and Measurement**
A	**Draw and describe geometrical figures and describe the relationships between them.**
2	Use a variety of tools to construct geometric shapes.
a	Determine if provided constraints will create a unique triangle through construction.

Expectation Unwrapped – the intent of this section is to describe the elements of the expectation, but are NOT additional standards or expectations.	**Sample Stems**
The expectations in 7.GM.A.2 (a and b) show how 7th grade students will use a variety of tools (straightedge, protractor, compass, and/or technology) to construct geometric shapes. The student will construct triangles given 3 sides, given 3 angles, or given a combination of 3 sides and/or angles and decide if the measurements determine a unique triangle, more than one triangle, or no triangle. Since formal construction is a part of the standards in the course of Geometry, construction in this 7th grade standard would have students draw or use manipulatives to create a unique triangle.	If Triangle XYZ has XY=4 and XZ = 18, what could be a possible length for the side YZ? What would NOT be a possible length for the side YZ? Support your answers using words, models, or other mathematical strategies. Additional Stems for 7th Grade Found at End of Document.

State Assessment Content Limits/Boundaries - Classroom Work Should Extend Beyond These Limits	**Calculator Designation**
Limit side lengths and angle measures to whole numbers.	**YES** – a calculator will be available for items

DOK Ceiling: 3

Item Format: Selected Response, Constructed Response, Technology Enhanced

Grade 7 Mathematics

Mathematics	7.GM.A.2.b

GM	**Geometry and Measurement**
A	**Draw and describe geometrical figures and describe the relationships between them.**
2	Use a variety of tools to construct geometric shapes.
b	Construct special quadrilaterals given specific parameters.

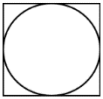| **Expectation Unwrapped – the intent of this section is to describe the elements of the expectation, but are NOT additional standards or expectations.**	**Sample Stems**
The expectations in 7.GM.A.2 (a and b) show how 7th grade students will use a variety of tools (straightedge, protractor, compass, and/or technology) to construct geometric shapes. The student will construct special quadrilaterals given specific parameters about angles or sides, e.g., kite, trapezoid, rhombus, parallelogram, rectangle, and square. Since formal construction is a part of the standards in the course of Geometry, construction in this 7th grade standard would have students draw or use manipulatives to create special quadrilaterals given specific parameters. Since students across the state have different materials (with two different definitions), the state of Missouri has chosen not to assess students on the definition of a trapezoid. There will be trapezoids on the assessment, but not questions specific to the definition. We suggest that students should be aware of both definitions for trapezoids because the math we study is based upon rules (definitions, theorems, etc.). When those rules are changed or altered, new branches of math are created. This is one of the reasons it is important to understand the "rules" being used and it is something that is exciting about math that new things can be discovered or invented.	Construct the following shapes. If any construction is not possible, be sure to explain why. A kite with one 90-degree angle. A rhombus with one 90-degree angle. A trapezoid with two 90-degree angles. A rhombus with two 90-degree angles. Additional Stems for 7th Grade Found at End of Document.
State Assessment Content Limits/Boundaries - Classroom Work Should Extend Beyond These Limits Limit side lengths and angle measures to whole numbers.	**Calculator Designation** **YES** – a calculator will be available for items
DOK Ceiling: 3	
Item Format: Selected Response, Constructed Response, Technology Enhanced	

Grade 7 Mathematics

Mathematics	7.GM.A.3

GM A 3	**Geometry and Measurement**
	Draw and describe geometrical figures and describe the relationships between them.
	Describe two-dimensional cross sections of pyramids, prisms, cones and cylinders.

Expectation Unwrapped – the intent of this section is to describe the elements of the expectation, but are NOT additional standards or expectations.	**Sample Stems**
The student will describe two-dimensional cross sections of pyramids, cones, cylinders, and prisms including cross-sections that are not necessarily parallel or perpendicular to the base of the figure. In 7th grade, students will not be expected to find the slant height of pyramids.	A cube is cut into two pieces by a single slice that passes through points A, B, and C . What shape is the cross section? Identify the cross section when one cuts a cylinder vertically. Identify the cross section when one cuts a cylinder horizontally. Additional Stems for 7th Grade Found at End of Document.

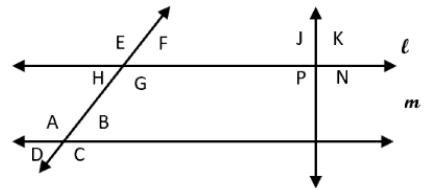| **State Assessment Content Limits/Boundaries - Classroom Work Should Extend Beyond These Limits**	**Calculator Designation**
All items should include a graphic. Cones that are sliced perpendicular to the base must go through the vertex. No oblique three-dimensional figures. Naming the cross sections should be limited to shapes previously identified in grades K-7, e.g., no ellipses.	**YES** – a calculator will be available for items
DOK Ceiling: 3	
Item Format: Selected Response, Constructed Response, Technology Enhanced	

Grade 7 Mathematics

Mathematics	7.GM.A.4.a
GM **Geometry and Measurement**	**PRIORITY STANDARD**
A **Draw and describe geometrical figures and describe the relationships between them.**	
4 Understand the concepts of circles.	
a Analyze the relationships among the circumference, the radius, the diameter, the area and Pi in a circle.	

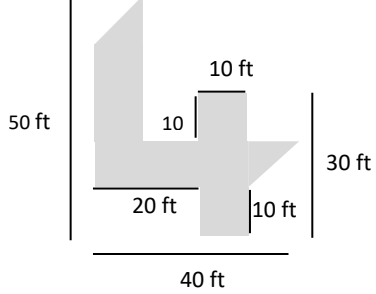| Expectation Unwrapped – the intent of this section is to describe the elements of the expectation, but are NOT additional standards or expectations.	Sample Stems
The expectations in 7.GM.A.4 (a and b) show how 7th grade students will understand concepts of circles. The student will demonstrate an understanding of the relationships in a circle: radius, diameter, circumference, π, and area. The student will understand that the value of pi can be derived by taking the circumference of circle and dividing it by its diameter, $\pi = \frac{C}{d}$.	What happens to the area of a circle when the radius is doubled. Use examples in your explanation. Additional Stems for 7th Grade Found at End of Document.
State Assessment Content Limits/Boundaries - Classroom Work Should Extend Beyond These Limits No Limits.	**Calculator Designation** **YES** – a calculator will be available for items
DOK Ceiling: 3	
Item Format: Selected Response, Constructed Response, Technology Enhanced	

Grade 7 Mathematics

Mathematics		7.GM.A.4.b
GM	**Geometry and Measurement**	**PRIORITY STANDARD**
A	**Draw and describe geometrical figures and describe the relationships between them.**	
4	Understand the concepts of circles.	
b	Know and apply the formulas for circumference and area of circles to solve problems.	

Expectation Unwrapped – the intent of this section is to describe the elements of the expectation, but are NOT additional standards or expectations.	**Sample Stems**
The expectations in 7.GM.A.4 (a and b) show how 7th grade students will understand concepts of circles. The student will know and apply the formulas for circumference and area of circles to solve problems with or without context. Note: When using π, students should have the flexibility to use 3.14, $\frac{22}{7}$, or some other approximation depending on the situation or type of solution needed.	Students working with circumference and area of circles. They are given a square with side lengths 4 cm with a circle within the square. The circle touches the square halfway between the vertices – see diagram below. Compare the circumference and area of the circle to the square's perimeter and area. Be sure to include your work in your explanations. Additional Stems for 7th Grade Found at End of Document.

State Assessment Content Limits/Boundaries - Classroom Work Should Extend Beyond These Limits Items will not expect students to solve for the radius when given the area.	**Calculator Designation** **YES** – a calculator will be available for items
DOK Ceiling: 3	
Item Format: Selected Response, Constructed Response, Technology Enhanced	

Grade 7 Mathematics

Mathematics	7.GM.B.5

| GM B 5 | **Geometry and Measurement**

Apply and extend previous understanding of angle measure, area and volume.

Use angle properties to write and solve equations for an unknown angle. | |

Expectation Unwrapped – the intent of this section is to describe the elements of the expectation, but are NOT additional standards or expectations. The student will use facts about supplementary, complementary, vertical, and adjacent angles to write and solve equations for an unknown angle.	**Sample Stems** Using the image below given two parallel lines, *l* and *m*, and angle A measuring 130°, write an equation that uses facts about supplementary or vertical angles and then solve that equation for angle G. Additional Stems for 7th Grade Found at End of Document.
State Assessment Content Limits/Boundaries - Classroom Work Should Extend Beyond These Limits Equations should be limited to one or two-step equations when solving for an unknown value.	**Calculator Designation** **YES** – a calculator will be available for items
DOK Ceiling: 3	
Item Format: Selected Response, Constructed Response, Technology Enhanced	

Grade 7 Mathematics

Mathematics	7.GM.B.6.a
GM — Geometry and Measurement	**PRIORITY STANDARD**
B — **Apply and extend previous understanding of angle measure, area and volume.**	
6 — Understand the relationship between area, surface area and volume.	
a — Find the area of triangles, quadrilaterals and other polygons composed of triangles and rectangles.	

Expectation Unwrapped – the intent of this section is to describe the elements of the expectation, but are NOT additional standards or expectations.	Sample Stems
The expectations in 7.GM.B.6 (a and b) show how 7th grade students will understand the relationship between area, surface area, and volume. Solve problems, with or without context, involving area, surface area, and volume. The student will understand the concept of area and find the area of triangles, quadrilaterals, and other polygons composed of triangles and rectangles.	A professional basketball player wants to build a custom swimming pool in the shape of their jersey, number 4. Below is the plan for the pool. What is the area of the pool? Additional Stems for 7th Grade Found at End of Document.

State Assessment Content Limits/Boundaries - Classroom Work Should Extend Beyond These Limits	Calculator Designation
Limit to rational numbers.	**YES** – a calculator will be available for items
DOK Ceiling: 3	
Item Format: Selected Response, Constructed Response, Technology Enhanced	

Grade 7 Mathematics

Mathematics	7.GM.B.6.b
GM **Geometry and Measurement**	PRIORITY STANDARD
B **Apply and extend previous understanding of angle measure, area and volume.**	
6 Understand the relationship between area, surface area and volume.	
b Find the volume and surface area of prisms, pyramids and cylinders.	

Expectation Unwrapped – the intent of this section is to describe the elements of the expectation, but are NOT additional standards or expectations.	Sample Stems
The expectations in 7.GM.B.6 (a and b) show how 7th grade students will understand the relationship between area, surface area, and volume. Solve problems, with or without context, involving area, surface area and volume. The student will understand the concepts of volume and surface area and find related measures for right prisms (triangular and rectangular - including cubes), right pyramids (triangular and rectangular), and right cylinders.	Patti, the pattern maker, is wondering what happens to the volume and surface area when a side length is doubled. To explore this pattern, she uses a rectangular prism with a width of 3, a length of 4 and a height of 5. If the height is doubled, one of Patti's classmates thinks that the surface area and volume will also double. Patti wants to explore this further. Find the surface area and volume of the original prism and compare those to the new figure (where the height doubles). Additional Stems for 7th Grade Found at End of Document.
State Assessment Content Limits/Boundaries - Classroom Work Should Extend Beyond These Limits The height of any triangular faces will be given.	**Calculator Designation** **YES** – a calculator will be available for items
DOK Ceiling: 3	
Item Format: Selected Response, Constructed Response, Technology Enhanced	

Grade 7 Mathematics

Mathematics		7.DSP.A.1.a
DSP	**Data Analysis, Statistics and Probability**	
A	**Use random sampling to draw inferences about a population**	
1	Understand that statistics can be used to gain information about a population by examining a sample of the population.	
a	Understand that a sample is a subset of a population.	

Expectation Unwrapped – the intent of this section is to describe the elements of the expectation, but are NOT additional standards or expectations.	Sample Stems
The expectations in 7.DSP.A.1 (a through c) show how 7th grade students will understand that statistics can be used to gain information about a population by examining a sample of the population. The student will understand that a sample is a subset of a population and both the sample and the population (entire group) have similar characteristics, e.g., sample survey of who should be the 7th grade president should only include 7th graders and not the entire middle school.	Describe how or when the set of pets for one classroom could be a subset of the population. Additional Stems for 7th Grade Found at End of Document.

State Assessment Content Limits/Boundaries - Classroom Work Should Extend Beyond These Limits	Calculator Designation
No Limits.	**YES** – a calculator will be available for items

DOK Ceiling: 3

Item Format: Selected Response, Constructed Response, Technology Enhanced

Grade 7 Mathematics

Mathematics		7.DSP.A.1.b
DSP	Data Analysis, Statistics and Probability	PRIORITY STANDARD
A	**Use random sampling to draw inferences about a population**	
1	Understand that statistics can be used to gain information about a population by examining a sample of the population.	
b	Understand that generalizations from a sample are valid only if the sample is representative of the population.	

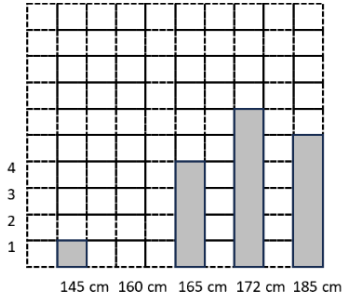| Expectation Unwrapped – the intent of this section is to describe the elements of the expectation, but are NOT additional standards or expectations.	Sample Stems
The expectations in 7.DSP.A.1 (a through c) show how 7th grade students will understand that statistics can be used to gain information about a population by examining a sample of the population. The student will understand that generalizations from a sample are valid only if the sample is representative (has the same characteristics) of the population.	Jim is surveying student sports preferences at a local soccer tournament. After taking the survey, Jim considers making some predictions about which sports are most popular for all students in his class. Describe how his generalizations will represent, or not represent, his classmates' sports preferences. Additional Stems for 7th Grade Found at End of Document.
State Assessment Content Limits/Boundaries - Classroom Work Should Extend Beyond These Limits No Limits.	**Calculator Designation** **YES** – a calculator will be available for items
DOK Ceiling: 3	
Item Format: Selected Response, Constructed Response, Technology Enhanced	

Grade 7 Mathematics

Mathematics	7.DSP.A.1.c

DSP	**Data Analysis, Statistics and Probability**
A	**Use random sampling to draw inferences about a population**
1	Understand that statistics can be used to gain information about a population by examining a sample of the population.
c	Understand that random sampling is used to produce representative samples and support valid inferences.

Expectation Unwrapped – the intent of this section is to describe the elements of the expectation, but are NOT additional standards or expectations.	**Sample Stems**
The expectations in 7.DSP.A.1 (a through c) show how 7th grade students will understand that statistics can be used to gain information about a population by examining a sample of the population. The student will understand the concept of random sampling and use it to produce representative samples of a given population. The student will use random sampling to support valid inferences about a given population.	The class is working to generate a sample to make a valid inference about the number of students who bring their own lunch. Given: 550 students, Sample: 75 students. What would need to be true about the sample to produce a representative sample? What are some possible inferences that can be made given an appropriate sample? Additional Stems for 7th Grade Found at End of Document.

State Assessment Content Limits/Boundaries - Classroom Work Should Extend Beyond These Limits	**Calculator Designation**
No Limits.	**YES** – a calculator will be available for items

DOK Ceiling: 3

Item Format: Selected Response, Constructed Response, Technology Enhanced

Grade 7 Mathematics

Mathematics	7.DSP.A.2

DSP A 2	**Data Analysis, Statistics and Probability** **Use random sampling to draw inferences about a population** Use data from multiple samples to draw inferences about a population and investigate variability in estimates of the characteristic of interest.

Expectation Unwrapped – the intent of this section is to describe the elements of the expectation, but are NOT additional standards or expectations.	**Sample Stems**
The student will use data from multiple samples to draw inferences (make conclusions) about a population and investigate variability in estimates of the characteristic of interest, e.g., estimate the mean word length in a book by randomly sampling words from the book; predict the winner of a school election based on randomly sampled survey data; gauge how far off each of the estimates or predictions might be. The student will make comparisons of data between the multiple samples and the actual results. The student will explain possible reasons for variation between the estimates or predictions from the sample, and the actual population.	The Department of Conservation wanted to monitor the bass population in a local lake, so they marked 4400 bass with tags. A week later, they captured 860 bass and noticed that 58 of them had tags. What is the best estimate for the bass population? Additional Stems for 7th Grade Found at End of Document.

State Assessment Content Limits/Boundaries - Classroom Work Should Extend Beyond These Limits	**Calculator Designation**
No Limits.	**YES** – a calculator will be available for items
DOK Ceiling: 3	
Item Format: Selected Response, Constructed Response, Technology Enhanced	

Grade 7 Mathematics

Mathematics	7.DSP.B.3

DSP B 3	**Data Analysis, Statistics and Probability** **Draw informal comparative inferences about two populations.** Analyze different data distributions using statistical measures.	PRIORITY STANDARD

Expectation Unwrapped – the intent of this section is to describe the elements of the expectation, but are NOT additional standards or expectations.	**Sample Stems**
The student will analyze different data distributions using statistical measures of center or variability to select a statistical measure to model the situation. The student will compare different data distributions from two populations using measures of center (mean, median, or mode), or using measures of variability (range, interquartile range, or mean absolute deviation). The student will informally assess the degree of visual overlap of two graphical displays of data sets with similar variabilities, e.g., comparing the mean height of one sports team to another where the visual overlap is apparent.	Identify the best measure of center and variability to describe the following data on the heights of a classroom. Additional Stems for 7th Grade Found at End of Document.

State Assessment Content Limits/Boundaries - Classroom Work Should Extend Beyond These Limits	**Calculator Designation**
Not creating or computing statistical measures, only analyzing. Graphics of multiple distributions (limited to box plot, histogram, dot plot) will be given in the problems.	**YES** – a calculator will be available for items

DOK Ceiling: 3

Item Format: Selected Response, Constructed Response, Technology Enhanced

Grade 7 Mathematics

Mathematics	7.DSP.B.4

DSP **B** **4**	**Data Analysis, Statistics and Probability** **Draw informal comparative inferences about two populations.** Compare the numerical measures of center, measures of frequency and measures of variability from two random samples to draw inferences about the population.

Expectation Unwrapped – the intent of this section is to describe the elements of the expectation, but are NOT additional standards or expectations.	**Sample Stems**
The student will compare the numerical measures of center (mean, median, and mode), measures of frequency (mode) and measures of variability (range, interquartile range, mean absolute deviation) from two random samples to draw inferences about the populations.	A survey was conducted in two randomly selected neighborhoods in a city to compare the number of siblings in students' homes. The following data shows the number of siblings for each student in both neighborhoods. Neighborhood A: 1, 2, 2, 3, 3, 3, 4, 4, 4, 4, 5, 5, 5, 6, 6, 6, 6, 6, 7, 7 Neighborhood B: 1, 1, 2, 2, 2, 2, 3, 3, 3, 4, 4, 4, 4, 5, 5, 5, 6, 6, 6, 7 Compare the measures of center, frequency, and variability (range) between the two neighborhoods and draw conclusions about those populations. Additional Stems for 7th Grade Found at End of Document.

State Assessment Content Limits/Boundaries - Classroom Work Should Extend Beyond These Limits	**Calculator Designation**
Measures of center, frequency, and variability are given.	**YES** – a calculator will be available for items
DOK Ceiling: 3	
Item Format: Selected Response, Constructed Response, Technology Enhanced	

Grade 7 Mathematics

Mathematics		7.DSP.C.5.a
DSP	Data Analysis, Statistics and Probability	PRIORITY STANDARD
C	Develop, use and evaluate probability models.	
5	Investigate the probability of chance events.	
a	Determine probabilities of simple events.	

Expectation Unwrapped – the intent of this section is to describe the elements of the expectation, but are NOT additional standards or expectations.	Sample Stems
The expectations in 7.DSP.C.5 (a and b) show how 7th grade students will investigate the probability of chance events. The student will determine probabilities of simple (single) events.	If you roll a fair six-sided die, what is the probability of rolling a number that is greater than 4? Additional Stems for 7th Grade Found at End of Document.

State Assessment Content Limits/Boundaries - Classroom Work Should Extend Beyond These Limits	Calculator Designation
No Limits.	**YES** – a calculator will be available for items
DOK Ceiling: 3	
Item Format: Selected Response, Constructed Response, Technology Enhanced	

Grade 7 Mathematics

Mathematics		7.DSP.C.5.b
DSP	**Data Analysis, Statistics and Probability**	**PRIORITY STANDARD**
C	**Develop, use and evaluate probability models.**	
5	Investigate the probability of chance events.	
b	Understand that the probability of a chance event is a number between 0 and 1 that expresses the likelihood of the event occurring.	

Expectation Unwrapped – the intent of this section is to describe the elements of the expectation, but are NOT additional standards or expectations.	**Sample Stems**
The expectations in 7.DSP.C.5 (a and b) show how 7th grade students will investigate the probability of chance events. The student will understand that the probability of a chance event is a number from 0 and 1 that expresses the likelihood of the event occurring. The student will understand that as a probability approaches 0, the event becomes less likely and as a probability approaches 1, the event becomes more likely. The student will understand that a probability of $\frac{1}{2}$, or approaching $\frac{1}{2}$, indicates an event that is neither likely nor unlikely.	You are playing a carnival game where you must toss a ring onto a peg. The peg is 2 inches in diameter and the ring is 1 inch in diameter. What is the probability of landing the ring onto the peg? Assume that the ring will land completely on the peg if it touches the edge of the peg. Use your understanding that the probability of a chance event is a number between 0 and 1 that expresses the likelihood of the event occurring to answer the question. Additional Stems for 7th Grade Found at End of Document.
State Assessment Content Limits/Boundaries - Classroom Work Should Extend Beyond These Limits No Limits.	**Calculator Designation** **YES** – a calculator will be available for items
DOK Ceiling: 3	
Item Format: Selected Response, Constructed Response, Technology Enhanced	

Grade 7 Mathematics

Mathematics	7.DSP.C.6.a

DSP	Data Analysis, Statistics and Probability
C	**Develop, use and evaluate probability models.**
6	Investigate the relationship between theoretical and experimental probabilities for simple events.
a	Predict outcomes using theoretical probability.

Expectation Unwrapped – the intent of this section is to describe the elements of the expectation, but are NOT additional standards or expectations.	**Sample Stems**
The expectations in 7.DSP.C.6 (a through c) show how 7th grade students will investigate the relationship between theoretical and experimental probabilities for simple events. The student will predict outcomes using theoretical probability, e.g., flipping a fair coin would expect to get 50% heads and 50% tails. The student will understand that a theoretical probability of 0 indicates an impossible event and that the theoretical probability of 1 indicates a certain event.	You have a bag containing 10 red marbles, 6 blue marbles, and 4 green marbles. If you randomly choose a marble from the bag, what is the theoretical probability of selecting a blue marble? Based on the theoretical probabilities, predict the outcome if you selected 20 times. Additional Stems for 7th Grade Found at End of Document.

State Assessment Content Limits/Boundaries - Classroom Work Should Extend Beyond These Limits	**Calculator Designation**
No Limits.	**YES** – a calculator will be available for items
DOK Ceiling: 3	
Item Format: Selected Response, Constructed Response, Technology Enhanced	

Grade 7 Mathematics

Mathematics	7.DSP.C.6.b
DSP	**Data Analysis, Statistics and Probability**	
C	**Develop, use and evaluate probability models.**	
6	Investigate the relationship between theoretical and experimental probabilities for simple events.	
b	Perform experiments that model theoretical probability.	

Expectation Unwrapped – the intent of this section is to describe the elements of the expectation, but are NOT additional standards or expectations.	Sample Stems
The expectations in 7.DSP.C.6 (a through c) show how 7th grade students will investigate the relationship between theoretical and experimental probabilities for simple events. The student will perform experiments that model theoretical probability.	You have a fair six-sided die, numbered 1 through 6. What is the theoretical probability of rolling a number greater than 3? If you roll the die 30 times and record the results, what would you expect the experimental probability of rolling a number greater than 3 to be? How could you use the data to compare the theoretical and experimental probabilities? Additional Stems for 7th Grade Found at End of Document.
State Assessment Content Limits/Boundaries - Classroom Work Should Extend Beyond These Limits No Limits.	**Calculator Designation** **YES** – a calculator will be available for items
DOK Ceiling: 3	
Item Format: Selected Response, Constructed Response, Technology Enhanced	

Grade 7 Mathematics

Mathematics	7.DSP.C.6.c
DSP	**Data Analysis, Statistics and Probability**	
C	**Develop, use and evaluate probability models.**	
6	Investigate the relationship between theoretical and experimental probabilities for simple events.	
c	Compare theoretical and experimental probabilities.	

Expectation Unwrapped – the intent of this section is to describe the elements of the expectation, but are NOT additional standards or expectations.	Sample Stems
The expectations in 7.DSP.C.6 (a through c) show how 7th grade students will investigate the relationship between theoretical and experimental probabilities for simple events. The student will compare theoretical and experimental probabilities, e.g., comparing theoretical probabilities to experimental probabilities resulting from flipping a fair coin and monitoring those results, e.g., getting 8 tails and 2 heads.	You have a bag containing 10 red marbles, 6 blue marbles, and 4 green marbles. If you randomly choose a marble from the bag, what is the theoretical probability of selecting a blue marble? If you repeat this process 20 times and record the results, what would you expect the experimental probability of selecting a blue marble to be? How could you use the data to compare the theoretical and experimental probabilities? Describe how the experimental probability would be more or less likely to match the theoretical probability if you repeated the process 100 times instead of 20 times? Additional Stems for 7th Grade Found at End of Document.
State Assessment Content Limits/Boundaries - Classroom Work Should Extend Beyond These Limits No Limits.	**Calculator Designation** **YES** – a calculator will be available for items
DOK Ceiling: 3	
Item Format: Selected Response, Constructed Response, Technology Enhanced	

Grade 7 Mathematics

Mathematics	7.DSP.C.7.a
DSP	**Data Analysis, Statistics and Probability**	
C	**Develop, use and evaluate probability models.**	
7	Explain possible discrepancies between a developed probability model and observed frequencies.	
a	Develop a uniform probability model by assigning equal probability to all outcomes, and use the model to determine probabilities of events.	

Expectation Unwrapped – the intent of this section is to describe the elements of the expectation, but are NOT additional standards or expectations.	**Sample Stems**
The expectations in 7.DSP.C.7 (a and b) show how 7th grade students will explain possible discrepancies between a developed probability model and observed frequencies. The student will develop a uniform probability model by assigning equal probability to all outcomes and use the model to determine probabilities of events, e.g., using a 6-sided number cube and a 6 equally proportioned spinner. The student will compare probabilities from a model to observed frequencies; explain possible sources of the discrepancy if they exist.	Develop a model to represent 6 equally likely outcomes. Use your model to determine the outcome of getting one of the outcomes represented with your model. Additional Stems for 7th Grade Found at End of Document.
State Assessment Content Limits/Boundaries - Classroom Work Should Extend Beyond These Limits No Limits.	**Calculator Designation** **YES** – a calculator will be available for items
DOK Ceiling: 3	
Item Format: Selected Response, Constructed Response, Technology Enhanced	

Grade 7 Mathematics

Mathematics	7.DSP.C.7.b

DSP	Data Analysis, Statistics and Probability
C	Develop, use and evaluate probability models.
7	Explain possible discrepancies between a developed probability model and observed frequencies.
b	Develop a probability model (which may not be uniform) by observing frequencies in data generated from a chance process.

Expectation Unwrapped – the intent of this section is to describe the elements of the expectation, but are NOT additional standards or expectations.	Sample Stems
The expectations in 7.DSP.C.7 (a and b) show how 7th grade students will explain possible discrepancies between a developed probability model and observed frequencies. The student will develop a probability model (which may not be uniform, e.g., a spinner that does not have equal outcomes) by observing frequencies in data generated from a chance process. The student will observe frequencies in data, in a chance process, to assess the probability. The student will compare probabilities from a model to observed frequencies; explain possible sources of the discrepancy if they exist.	Describe a probability model you create, which may not be uniform, then observe the frequencies generated from the chance process created. Compare the probabilities between the model and the observed frequencies. Additional Stems for 7th Grade Found at End of Document.

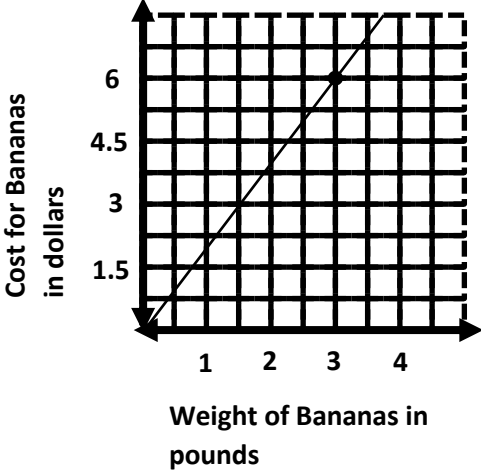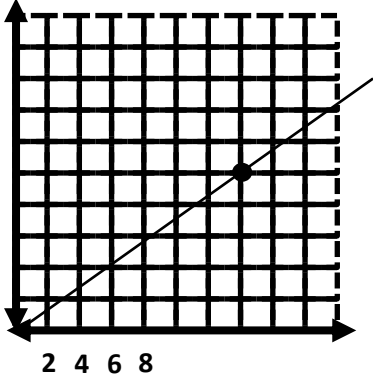| State Assessment Content Limits/Boundaries - Classroom Work Should Extend Beyond These Limits	Calculator Designation
No Limits.	**YES** – a calculator will be available for items
DOK Ceiling: 3	
Item Format: Selected Response, Constructed Response, Technology Enhanced	

Grade 7 Mathematics

Mathematics	7.DSP.C.8.a
DSP	**Data Analysis, Statistics and Probability**	
C	**Develop, use and evaluate probability models.**	
8	Find probabilities of compound events using organized lists, tables, tree diagrams and simulations.	
a	Represent the sample space of a compound event.	

Expectation Unwrapped – the intent of this section is to describe the elements of the expectation, but are NOT additional standards or expectations.	Sample Stems
The expectations in 7.DSP.C.8 (a and b) show how 7th grade students will find probabilities of compound events using organized lists, tables, tree diagrams and simulations. The student will represent the sample space (set or collection of possible outcomes for a random experiment) for simulations of compound events, e.g., combining a coin and a spinner, by using methods such as organized lists, tables, and tree diagrams. For an event described in everyday language, e.g., "rolling double sixes", identify the outcomes in the sample space which compose the event.	A company has 3 men and 5 women who have applied for a job, and they need to hire 2 people for the position. What are some methods that could be used to represent the sample space created by running this simulation to see what the probability that both people hired are women. Additional Stems for 7th Grade Found at End of Document.
State Assessment Content Limits/Boundaries - Classroom Work Should Extend Beyond These Limits Limited to two events.	**Calculator Designation** **YES** – a calculator will be available for items
DOK Ceiling: 3	
Item Format: Selected Response, Constructed Response, Technology Enhanced	

Grade 7 Mathematics

Mathematics		7.DSP.C.8.b
DSP	**Data Analysis, Statistics and Probability**	
C	**Develop, use and evaluate probability models.**	
8	Find probabilities of compound events using organized lists, tables, tree diagrams and simulations.	
b	Design and use a simulation to generate frequencies for compound events.	

Expectation Unwrapped – the intent of this section is to describe the elements of the expectation, but are NOT additional standards or expectations.	**Sample Stems**
The expectations in 7.DSP.C.8 (a and b) show how 7th grade students will find probabilities of compound events using organized lists, tables, tree diagrams and simulations. The student will design and use a simulation to generate frequencies for compound events.	Design and use a simulation to generate frequencies for compound events. Additional Stems for 7th Grade Found at End of Document.
State Assessment Content Limits/Boundaries - Classroom Work Should Extend Beyond These Limits Limited to two events.	**Calculator Designation** **YES** – a calculator will be available for items
DOK Ceiling: 3	
Item Format: Selected Response, Constructed Response, Technology Enhanced	

Grade 7 Mathematics

Code	Sample Stem	Explanation
7.RP.A.1	A store has 10 oranges for $4.25. What is the unit rate?	Note: this type of question could have two appropriate answers depending on how the unit is described (either per dollar or per orange). The context or purpose for the unit rate is important to discuss as well as decide when solving. When one specific unit is requested, the question should specify which is desired.
	Linda runs one third of a mile in 4 minutes. If she continues at the same speed, how can this situation be used to describe a unit rate? Use this information to determine how long it will take her to run 1 mile. Explain your solution, be sure to include a description of the rate in terms of the units used in the problem.	
7.RP.A.2a	Kristie signed up for a gym membership at Fitness Plus. Her plan cost $95 in start-up fees the first month and then $20 per month thereafter. Her friend Teri also signed up at Fitness Plus during a 3-day promotional offer that waived the initial start-up fees. Her plan costs $35 per month. Decide if either or both gym memberships are described by a proportional relationship. Support your answer using tables, graphs, and/or equations.	
	The table below shows the cups of mixed nuts and pretzels needed for the special party mix. Complete the table by filling in the missing values. 	Mixed nuts	5			30	 	Pretzels	2	4	1		 Explain how to determine if these quantities are in a proportional relationship.	
7.RP.A.2b	Mark and Michelle are comparing inches and feet. Mark says that the constant of proportionality is 12. Michelle says it is 1/12. Do you agree with either of them? Explain your reasoning.	

Grade 7 Mathematics

Code	Sample Stem	Explanation
	Explain what the point (3, 6) means in terms of the situation represented in the graph below. 	
7.RP.A.2c	Create a context that could be represented by the graph below. Give your graph a title and label the axes. What does the point on the graph represent in the context you've created? 	
7.RP.A.2d	Describe the characteristics of a graph of any proportional relationship.	
7.RP.A.3	Fred has $1000 in his savings account. A year earlier he started with $750. What was the percent increase in his savings account?	
	Solve the problem below. Describe what steps you took to find the solution. $$3.4 - 7.04$$	
7.NS.A.1a	John found the difference between two negative numbers and the solution was positive. Jane said that cannot happen. Which student is correct and explain why?	
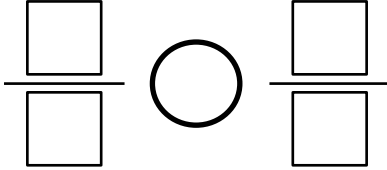
Grade 7 Mathematics

Code	Sample Stem	Explanation
7.NS.A.1b	Create an addition and a subtraction problem using rational numbers. Represent each problem's solution using a number line (either vertical or horizontal).	
	When would it be good to use a vertical number line to represent an addition or a subtraction problem using rational numbers? Explain your answer using some examples.	
7.NS.A.1c	Given $a + b = 0$, John says **b** must be negative. Jane does not agree. Who is correct and explain why?	
7.NS.A.1d	Explain why the subtraction of a rational number is the same as adding that rational number's additive inverse. Use examples in your explanation.	
7.NS.A.1e	Create a subtraction problem and show how its solution can be represented on a number line. After showing the solution, explain how the number line (the distance) is one way to represent the absolute value of the difference between the numbers in the subtraction problem.	
	Compare (similarities and differences) between finding the distance between two points a and b being represented by $|a| - |b|$ or $|a - b|$	
7.NS.A.1f	Given an example of where $a + b < a - b$	
	Caleb bought $5\frac{1}{2}$ pounds of candy for his friends. The candy looked so good that he at $1\frac{1}{3}$ pounds of it. How much did he give to his friends?	
	Kelsey and Katie ordered two medium pizzas, one cheese and one supreme. Kelsey ate 4/5 of pizza and Katie ate 1/2 of pizza. How much pizza did they eat together? What are some possible combinations of how much of each pizza was left to take home?	
	Neely believes that the sum of two negative numbers will always be negative. Use graphs, number lines, words, or other math strategies to explain why you agree or disagree with Neely.	

Updated 6/20/2024

Grade 7 Mathematics

Code	Sample Stem	Explanation
7.NS.A.2a	A group of students are working on dividing rational numbers. One student solved the following problem and found the answer was 2. Do you agree with this solution? Explain why or why not, if you disagree what are some possible errors the student made? $$2\frac{2}{3} \div \frac{2}{3}$$	
	Dana is solving the following problem: $$2 \div \frac{2}{3} =$$ How can Dana model her solution to support her answer?	
7.NS.A.2b	Do multiplicative inverses have to have the same sign? Explain why or why not?	
	Can a fraction and a decimal be multiplicative inverses? Explain your answer including some examples.	
	Explain why two numbers are multiplicative inverses.	
7.NS.A.2c	For what values of n would $\frac{\frac{1}{2}}{\frac{1}{n}}$ be rational?	
	Explain why $\frac{\pi}{1}$ rational or irrational.	
	Two students are discussing whether or not $\frac{1}{3}$ rational or irrational. Describe a few ways to show that it is rational and a few ways to show that it is irrational. What is the correct answer?	
7.NS.A.2d	Convert each of the numbers or percent below. Describe how each represents a rational number. $\frac{2}{9}$　$\frac{43}{99}$　$\frac{5}{6}$　25%　$\frac{5}{4}$　$\frac{45}{7}$	

Grade 7 Mathematics

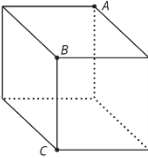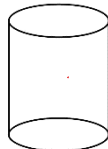| Code	Sample Stem	Explanation
7.NS.A.2e	Explain whether or not $\frac{\frac{1}{2}}{\frac{1}{3}}$ is a rational or irrational number.	
	Convert each of the fractions below into decimal representations. Describe patterns that you observe. $\frac{1}{7}$ $\frac{3}{7}$ $\frac{5}{7}$ $\frac{6}{7}$ Does the pattern hold for $\frac{45}{7}$?	
7.NS.A.2f	John has $2\frac{1}{3}$ pints of orange juice concentrate. It takes $\frac{2}{3}$ pints to make a pitcher of orange juice. What type of question would be answered if this information was used to find a product? What type of question would be answered if this information was used to find a quotient? Be sure to include both solutions in your explanation.	
7.NS.A.3	Numbers randomly drawn and filled in immediately after drawing. Trying to get the best solution. Which operation, + - x or ÷, would create the largest solution 	Multiple variations possible for this problem. Numbers could be generated using dice or some other random generator. The "best answer" is also a conversation. It could be greatest, least, closest to zero (or some other number). Here are some possible numbers sets to use: 0,3,6,8 2,1,6,8 5,5,7,3 5,3,8,2
7.EEI.A.1	Compare the impact to the perimeter and area of a rectangle if you double the length. Note you could use examples or manipulatives to explore this problem before describing the impact.	In this question students are looking at only doubling the length and leaving the width the same. They would compare the original perimeter and area to the new perimeter and area.
	Simplify the following expression: $6 - 3(4x - 2y)$	
	Simplify the following expression: $(2x + 3 + 4x) \div 6$	For this expression there may be more than one simplified form that would be useful. Just a note to remind that the expectation does not ask to have expressions to be put in simplest form.

Grade 7 Mathematics

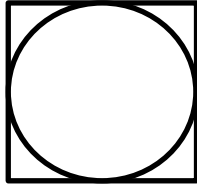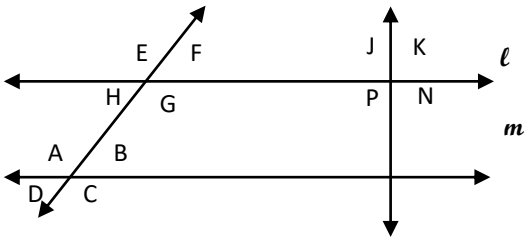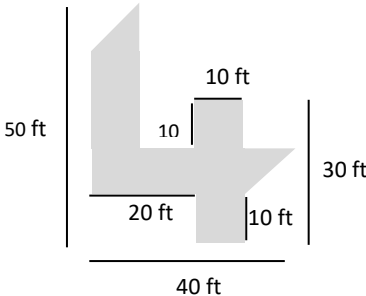| Code	Sample Stem	Explanation
7.EEI.A.2	A store has their hats on sale for $\frac{1}{3}$ off. If the hat you like is normally $12, what is its sale price?	Students should understand how to manipulate the numbers in a way that works best for them. They should have the opportunity to see multiple ways to solve problems, including ones in this standard.
	Jenny believes that adding a 20% tip can be calculated in more than one way. She uses the example of a 20% tip on a $80 food bill could calculated either by 80*1.2 or by adding 80 and 80*.2 Do you agree with Jenny? Explain why you agree, what Jenny did in error.	
7.EEI.B.3a	Use the number $\frac{1}{3}$ to show situations or problems when you would use equivalent for of the number rather this rational form.	Note the other forms could be equivalent rational, percent or some other equivalent representation that makes the student feel more efficient.
7.EEI.B.3b	Wren was asked to calculate 25.1 x 2.2 mentally. Wren's answer was 502.2. Without calculating, explain how Wren can know if this is (or is not) a reasonable answer.	
7.EEI.B.4a	For each of the equations below, identify a few things you believe must be true about x before solving for x. Solve each equation for x. $x - 5 = 7 \qquad 3 = -2x \qquad 3 = -2 + x$ $\frac{x}{-3} = \frac{1}{2} \qquad \frac{5}{3}x = -10$	
7.EEI.B.4b	3x + 8 = 20 Create a contextual situation and find the solution. Explain the meaning of the solution given the context of the situation.	Students should be encouraged to use manipulatives to demonstrate their understanding, e.g., balance scales, algebra tiles.
	Solve the following equation for x. $5 = \frac{2}{3}(x - 7)$ Explain the meaning of the solution based on this context.	Students should understand how to manipulate the numbers in a way that works best for them. They should have the opportunity to see multiple ways to solve problems, including ones in this standard, e.g., the value in the parenthesis when multiplied by $\frac{2}{3}$ would equal 5.

Grade 7 Mathematics

Code	Sample Stem	Explanation
7.EEI.B.4c	An airline allows passengers to bring a suitcase that weighs less than or equal to 50 pounds onto the airplane for free. If a suitcase weighs more than 50 pounds, then the passenger will be charged a fee of $25. Kati is going on a trip and is packing her suitcase. Her suitcase weighs 4.8 pounds when it is empty. Write an inequality to represent the number of pounds that Kati can pack in her suitcase and not pay the fee.	
	Solve the following inequality for x. $$5 > \frac{2}{3}(x - 7)$$ Explain the meaning of the solution based on this context.	
7.GM.A.1	A scale drawing of a kitchen floor is $5\frac{3}{4}$ inches by $4\frac{1}{4}$ inches. If the scale is 1 in:24 in, what are the dimensions of the floor in feet?	
	If Triangle XYZ has XY=4 and XZ = 18, what could be a possible length for the side YZ? What would NOT be a possible length for the side YZ? Support your answers using words, models, or other mathematical strategies.	
7.GM.A.2a	Using the side lengths listed below, determine if those lengths create a unique triangle, more than one triangle or no triangle. Use words, models, or other mathematical strategies to explain your conclusion. (6, 8, 10) (5, 12, 17) (9, 9, 9)	

Grade 7 Mathematics

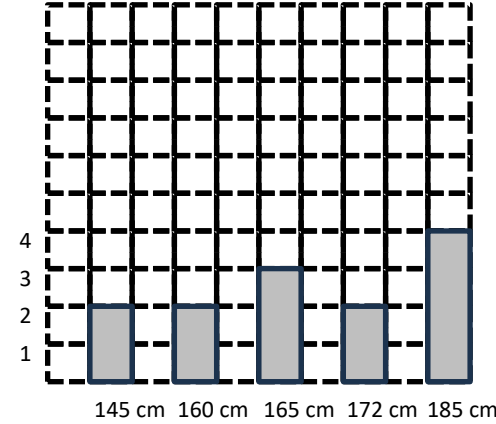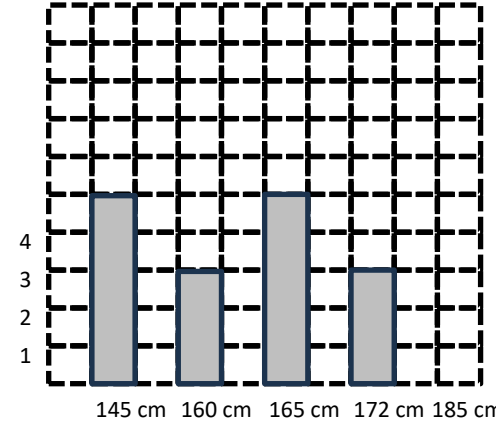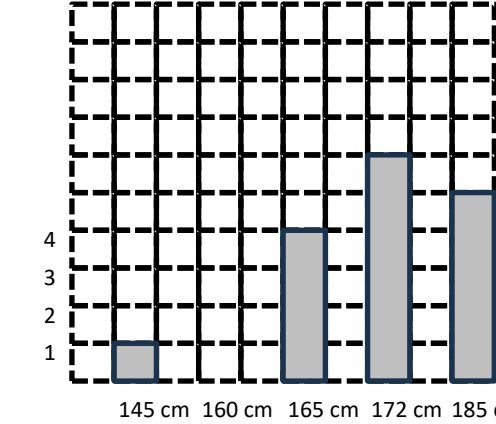| Code	Sample Stem	Explanation
	Construct the following shapes. If any construction is not possible, be sure to explain why. A kite with one 90-degree angle. A rhombus with one 90-degree angle. A trapezoid with two 90-degree angles. A rhombus with two 90-degree angles.	
7.GM.A.2b	How many figures are needed to be constructed to provide an example of the following special quadrilaterals: kite, rhombus, parallelogram, and rectangle. Terry believes they need to construct at least two shapes, but Toni disagrees. Which student do you agree with? Use what you know about the characteristics of each shape to support your conclusion. Construct the shape(s) to support your answer.	
7.GM.A.3	A cube is cut into two pieces by a single slice that passes through points A, B, and C. What shape is the cross section? Identify the cross section when one cuts a cylinder vertically. Identify the cross section when one cuts a cylinder horizontally.	
7.GM.A.4a	In a circle, describe how the radius and the diameter relate.	
	What happens to the area of a circle when the radius is doubled. Use examples in your explanation.	
	What happens to the circumference of a circle when the radius is doubled?	

Grade 7 Mathematics

Code	Sample Stem	Explanation
7.GM.A.4b	Using π, 3.14, and $\frac{22}{7}$ explore how doubling the radius impacts the circumference and area of a circle when the radius is doubled. Start with a radius of 7 in. Discuss the benefits/disadvantages of using each value for pi (π, 3.14, and $\frac{22}{7}$) and how might impact the solution.	
	Students working with circumference and area of circles. They are given a square with side lengths 4 cm with a circle within the square. The circle touches the square halfway between the vertices – see diagram below. Compare the circumference and area of the circle to the square's perimeter and area. Be sure to include your work in your explanations. 	
7.GM.B.5	Using the image below given two parallel lines, *l* and *m*, and angle A measuring 130°, write an equation that uses facts about supplementary or vertical angles and then solve that equation for angle G. 	Similar problems could be generated using complementary, vertical and adjacent angles.
7.GM.B.6a	A professional basketball player wants to build a custom swimming pool in the shape of their jersey, number 4. Below is the plan for the pool. What is the area of the pool? 	

Grade 7 Mathematics

Code	Sample Stem	Explanation
7.GM.B.6b	Patti, the pattern maker, is wondering what happens to the volume and surface area when a side length is doubled. To explore this pattern, she uses a rectangular prism with a width of 3, a length of 4 and a height of 5. If the height is doubled, one of Patti's classmates thinks that the surface area and volume will also double. Patti wants to explore this further. Find the surface area and volume of the original prism and compare those to the new figure (where the height doubles).	
7.DSP.A.1a	Describe how or when the set of pets for one classroom could be a subset of the population.	
7.DSP.A.1b	Jim is surveying student sports preferences at a local soccer tournament. After taking the survey, Jim considers making some predictions about which sports are most popular for all students in his class. Describe how his generalizations will represent, or not represent, his classmates' sports preferences.	
	In a poll of Mr. Smith's math class, 57% of the students say that PE is their favorite academic subject. The student body president is in the class, and he wants to discuss PE being the most favorite subject in the next student council meeting. Explain why this is not a valid conclusion and suggest a way to gather better data to determine what subject is most popular.	
7.DSP.A.1c	The class is working to generate a sample to make a valid inference about the number of students who bring their own lunch. Given: 550 students, Sample: 75 students. What would need to be true about the sample to produce a representative sample? What are some possible inferences that can be made given an appropriate sample?	
7.DSP.A.2	The Department of Conservation wanted to monitor the bass population in a local lake, so they marked 4400 bass with tags. A week later, they captured 860 bass and noticed that 58 of them had tags. What is the best estimate for the bass population?	

Grade 7 Mathematics

Code	Sample Stem	Explanation
	Decide on the best measure of center to use to compare the height of the basketball team to the height of the soccer team. Basketball team data: 145 cm 160 cm 165 cm 172 cm 185 cm Soccer team data: 145 cm 160 cm 165 cm 172 cm 185 cm	
7.DSP.B.3	Identify the best measure of center and variability to describe the following data on the heights of a classroom. 145 cm 160 cm 165 cm 172 cm 185 cm	

Grade 7 Mathematics

Code	Sample Stem	Explanation
7.DSP.B.4	A survey was conducted in two randomly selected neighborhoods in a city to compare the number of siblings in students' home. The following data shows the number of siblings for each student in both neighborhoods. Neighborhood A: 1, 2, 2, 3, 3, 3, 4, 4, 4, 4, 5, 5, 5, 6, 6, 6, 6, 6, 7, 7 Neighborhood B: 1, 1, 2, 2, 2, 2, 3, 3, 3, 4, 4, 4, 4, 5, 5, 5, 6, 6, 6, 7 Compare the measures of center, frequency and variability (range) between the two neighborhoods and draw conclusions about those populations.	
7.DSP.C.5a	If you roll a fair six-sided die, what is the probability of rolling a number that is greater than 4?	
7.DSP.C.5b	You are playing a carnival game where you must toss a ring onto a peg. The peg is 2 inches in diameter and the ring is 1 inch in diameter. What is the probability of landing the ring onto the peg? Assume that the ring will land completely on the peg if it touches the edge of the peg. Use your understanding that the probability of a chance event is a number between 0 and 1 that expresses the likelihood of the event occurring to answer the question.	
7.DSP.C.6a	You have a bag containing 10 red marbles, 6 blue marbles, and 4 green marbles. If you randomly choose a marble from the bag, what is the theoretical probability of selecting a blue marble? Based on the theoretical probabilities, predict the outcome if you selected 20 times.	
7.DSP.C.6b	You have a fair six-sided die, numbered 1 through 6. What is the theoretical probability of rolling a number greater than 3? If you roll the die 30 times and record the results, what would you expect the experimental probability of rolling a number greater than 3 to be? How could you use the data to compare the theoretical and experimental probabilities?	

Grade 7 Mathematics

Code	Sample Stem	Explanation
	You have a bag containing 10 red marbles, 6 blue marbles, and 4 green marbles. If you randomly choose a marble from the bag, what is the theoretical probability of selecting a blue marble? If you repeat this process 20 times and record the results, what would you expect the experimental probability of selecting a blue marble to be? How could you use the data to compare the theoretical and experimental probabilities? Describe how the experimental probability would be more or less likely to match the theoretical probability if you repeated the process 100 times instead of 20 times?	
7.DSP.C.6c	You have a fair six-sided die, numbered 1 through 6. What is the theoretical probability of rolling a number greater than 3? If you roll the die 30 times and record the results, what would you expect the experimental probability of rolling a number greater than 3 to be? How could you use the data to compare the theoretical and experimental probabilities? Describe how the experimental probability would be more or less likely to match the theoretical probability if you rolled the die 100 times instead of 30 times?	
7.DSP.C.7a	Develop a model to represent 6 equally likely outcomes. Use your model to determine the outcome of getting one of the outcomes represented with your model.	
7.DSP.C.7b	Find the approximate probability that a spinning penny will land heads up or that a tossed paper cup will land open-end down. Do the outcomes for the spinning penny appear to be equally likely based on the observed frequencies?	
	Describe a probability model you create, which may not be uniform, then observe the frequencies generated from the chance process created. Compare the probabilities between the model and the observed frequencies.	

Grade 7 Mathematics

Code	Sample Stem	Explanation
7.DSP.C.8a	A company has 3 men and 5 women who have applied for a job, and they need to hire 2 people for the position. What are some methods that could be used to represent the sample space created by running this simulation to see what the probability that both people hired are women.	
7.DSP.C.8b	Design and use a simulation to generate frequencies for compound events.	